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(71) Applicant: **AF GLOBAL BRANDS LIMITED** [GB/GB]; 6 St Andrew Street, 5th Floor, London EC4A 3AE (GB).

(72) Inventors: **EBDAH, Mohammad Ali**; c/o Al Fakher Tobacco Factory, Ajman Free Zone, Ajman (AE). **KRASIMIROV, Neven**; c/o Al Fakher Tobacco Factory, Ajman Free Zone, Ajman (AE).

(74) Agent: **FERRAR, Nicholas** et al.; Adamson Jones, BioCity Nottingham, Pennyfoot Street, Nottingham Nottinghamshire NG1 1GF (GB).

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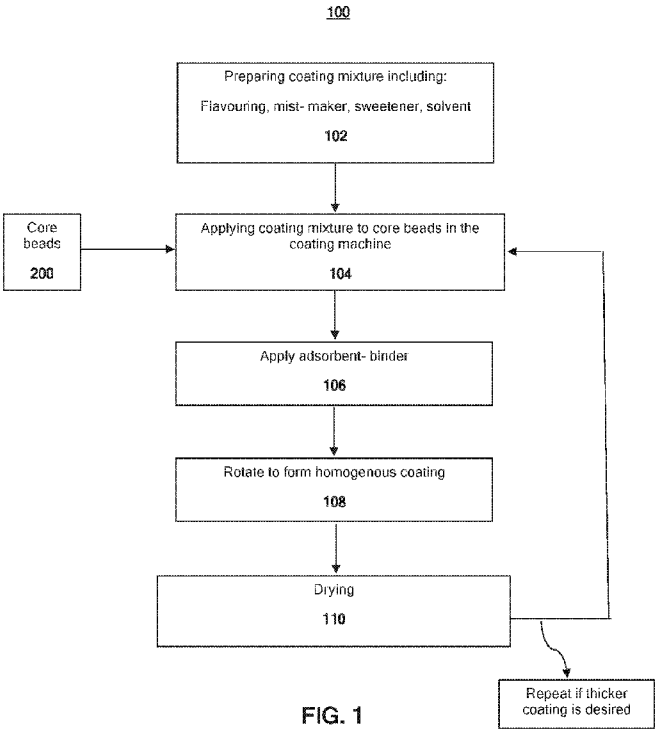

FIG. 1

(57) Abstract: A capsule for delivery of a flavoring in water-pipe smoke is disclosed herein. The disclosed capsule includes a core bead of an inert material and a coating layer encapsulating the bead. The coating layer contains a flavoring, an absorbent-binder, a mist-maker, a sweetener, a thickener. The coating layer is configured to provide release of the flavoring, sweetener and of the mist-maker when heated.

[Continued on next page]

WO 2020/174231 A1

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WATER-PIPE CAPSULE COMPOSITION

Technical Field

[0001] The present invention relates to flavored products for garnishing or replacing tobacco in a water-pipe.

Background

[0002] Due to health concerns and increasingly strict regulations, water-pipe smokers have developed a preference for tobacco substitutes or additives that produce cleaner and less toxic combustion products than tobacco itself or herbal additives. A popular class of substitutes are made by immersing glass or stone beads in a container of aromatic liquids that attach predominantly adhesively to their surface. The beads are then removed from the container with tongs or spoons and then inserted into the water-pipe. As the liquid tends to drip from their surface, it is preferred not to place the beads directly on top of the tobacco. Instead, a special bowl is usually needed to contain the liquid and prevent spillages.

Summary of the Invention

[0003] In accordance with a first set of representative embodiments of the invention, there is provided a capsule for delivery of a flavoring in water-pipe smoke. The capsule includes a core bead of an inert material and a coating layer encapsulating the bead. The coating layer includes the flavoring, an absorbent binder, a mist-maker, a sweetener, and a thickener. The coating layer is configured to release the flavoring, sweetener, and mist-maker when heated. In some

embodiments, the coating layer further includes a colorant. The coating layer may further include a stimulant, for example caffeine, taurine, theobromine, nicotine, and combinations thereof. The sweetener may be high-fructose corn syrup, fructose, glucose, sucrose, maltose, and combinations thereof. The material of the core bead may be stone, sand, glass, and combinations thereof. The absorbent-binder may be fumed silica, amorphous silica, talc, and combinations thereof. The mist-maker may be selected from the group consisting of glycerin, 1,2-propylene glycol, 1,3-propylene glycol, 1,2-butylene glycol, 1,3-butylene glycol, 1,4-butylene glycol, 2,3-butylene glycol, 1,2,4-butanetriol, triethylene glycol, triacetin, mannitol, sorbitol, xylitol, inositol, isosorbide, polydextrose, and combinations thereof. The thickener may be arrowroot, cornstarch, katakuri starch, potato starch, sago, tapioca, alginate, guar gum, locust bean gum, gum arabic, xanthan gum, collagen, egg whites, gelatin, agar, carboxymethyl cellulose, pectin, carrageenan, and combinations thereof.

[0004] In accordance with a second set of representative embodiments, there is provided method of manufacturing a capsule for delivery of a flavoring in water-pipe smoke. The method includes forming a coating mixture from ingredients including: a solvent, a mist maker, a sweetener, and a thickener; applying the coating mixture to a core bead of an inert material, to form a coating layer precursor on the surface of the core bead; applying an absorbent-binder material to the coating layer precursor; evaporating at least a portion of the solvent of the coating layer precursor, and applying the flavoring to the coating layer precursor, to form a product capsule including a coating layer encapsulating the core bead. The coating mixture may be applied to the core bead in a spray coating machine. In some embodiments, the solvent is an aqueous fluid. In some embodiments, the ingredients of the coating mixture further include a colorant. The coating mixture may also include a stimulant, for example caffeine, theobromine, taurine, nicotine, and combinations

thereof. The sweetener may be high-fructose corn syrup, fructose, glucose, sucrose, maltose, and combinations thereof. The inert material of the core bead may be stone, sand, glass, and combinations thereof, and the core bead may have a diameter of 0.5 mm to 20 mm. The absorbent-binder may be fumed silica, amorphous silica, talc, and combinations thereof.

Brief Description of the Drawings

[0005] The foregoing features of embodiments will be more readily understood by reference to the following detailed description, taken with reference to the accompanying drawing, in which:

[0006] FIG. 1 is a flow-chart illustrating an example method of manufacturing capsules for delivery of a flavoring in water-pipe smoke.

Detailed Description of the Invention

[0007] Definitions. As used in this description and the accompanying claims, the following terms shall have the meanings indicated, unless the context otherwise requires:

[0008] A "bead diameter" or "bead size" is the length of the longest straight axis between two points on the surface of the bead.

[0009] "Flavoring" or "flavorant" is a substance which alters or creates flavor for a product such as food, drink, or smoking composition that does not have the desired flavor or scent.

[0010] "Colorant" or "color additive" or "coloring" is a substance that is added or applied in order to change the color of a material. Colorants work by absorbing varying amounts of light at different wavelengths (or frequencies) of its spectrum, transmitting (if translucent) or reflecting the remaining light in straight lines or scattered. Most colorants can be classified as dyes or pigments, or containing some combination of these. Typical dyes are largely translucent, while

pigments are made up of solid corpuscles and are partially or entirely opaque. These properties may change when other common ingredients such as binders and fillers are added. In addition, some colorants impart color through reactions with other substances. Colorants, or their constituent compounds, may be classified chemically as inorganic (often from a mineral source) and organic (often from a biological source).

[0011] Unless otherwise specified, the term "wt%" refers to the amount of a component of a capsule, as expressed in percentage by weight.

[0012] CAPSULES WITH FLAVORED COATING

[0013] In a first set of embodiments, there are provided capsules for delivering a flavoring in water-pipe smoke. Unlike traditional tobacco substitutes, the capsules of the invention are not beads whose surface is imbued with fluid ingredients. Instead, each bead is enclosed within a solid encapsulating layer having a dry and smooth surface, preventing any undesired stickiness or spilling of liquids. The capsules can be easy handled without tongs or spoons and enable consumers to enjoy the mixology of unlimited flavors and colors by addition on top of a traditional tobacco product or by entirely replacing the tobacco with one type or a mixture of capsules having differing in appearance and aroma. As such, they are suitable to any kind of water-pipe and very convenient to use. Moreover, the ingredients of the capsules evaporate gradually, beginning from the outer surface then extending to the deeper sections of the encapsulating layer, resulting in a longer and more satisfactory performance.

[0014] CORE BEADS

[0015] The core beads of the capsules preferably are rounded in shape and in an embodiment have an average diameter from about 0.5 mm to 20 mm. In another embodiment, the average diameter of the particles is from about 1 mm to about 15 mm. Other suitable average diameter ranges

include about 2 mm to about 15 mm, about 2 mm to about 10 mm, and about 3 mm to about 10 mm. In some embodiments, the core beads are composed of a material that is chemically inert and that does not melt or degrade at temperatures equal to or below those at which tobacco or its substitutes are typically heated inside water-pipes. As such, the material of the core beads should be characterized by a melting point of more than 300 °C and preferably more than 350 °C or more than 400 °C. In one embodiment, the core bead material is a non-crystalline amorphous such as glass. The most common types of glass are "silicate glasses" based on the chemical compound silica (SiO_2), the primary constituent of sand. The term glass, in popular usage, is often used to refer only to this type of material, which is familiar from use as window glass and in glass bottles. Of the many silicate glasses that exist, the most common include: fused quartz, also known as fused-silica or vitreous silica, which is made of silica in vitreous form; soda-lime-silica glass; and sodium borosilicate glass. Other common materials include lead-oxide glass and aluminosilicate glass.

[0016] In another embodiment, the core beads are made of a stone material. As intended herein, the term "stone" or "rock" is meant to cover natural substances containing one or more minerals or mineraloids. A mineral is a naturally occurring chemical compound usually of crystalline form and not produced by life processes. For example, granite, a common rock, is a combination of the minerals quartz, feldspar and biotite. A mineraloid is a naturally-occurring mineral-like substance that does not demonstrate crystallinity. For example, obsidian is an amorphous glass and not a crystal, and "jet" is a mineraloid derived from decaying wood under extreme pressure.

[0017] Granular materials such as sand may also serve as core beads, provided that the small size of the granules does lead to aggregates rather than individual particles. Sand is a granular material composed of finely divided mineral or mineraloid beads. Sand is commonly divided into five sub-

categories based on average granule diameter ranges: very fine (0.0625 to 0.125 mm); fine (0.125 to 0.250 mm); coarse (0.250 to 0.5 mm); and very coarse (0.5 to 2 mm). The composition of mineral sand is highly variable, depending on the local rock sources and conditions.

[0018] COATING LAYER

[0019] The coating layer includes a flavoring, an absorbent-binder, a mist-maker, a sweetener, and a thickener. When heated to temperatures suitable for generating smoke in a water-pipe, the coating layer releases the flavoring, sweetener, and mist-maker into the smoke generated by the pipe. Without being bound to any particular theory, it is believed that the absorbent-binder absorbs liquids that are present in the mixture of ingredients from which the coating layer is prepared, leading to the formation of a uniform blend that encapsulates the core bead and is free of fluid residues such as liquids or syrups. This prevents the surface of the capsules from being damp or undesirably sticky.

[0020] (i) Absorbent-binder. In representative embodiments, the absorbent-binder is fumed silica, a powdery substance also known as pyrogenic silica that is made of droplets of amorphous silica fused into branched, chainlike, three-dimensional secondary beads which then agglomerate into tertiary beads. Again without wishing to be bound to any particular theory, it is believed that the three-dimensional structure and high surface area of fumed silica render it an excellent absorbent-binder for the coating layer of the capsules. Other example absorbent-binders include amorphous silica powder and talc powder.

[0021] (ii) Thickener. In the context of the invention, preferred thickeners are substances which are capable of forming gels in aqueous mixtures at room temperature. The thickener increases the viscosity of the coating layer and imparts it a shiny appearance. Typical thickeners are frequently based on either polysaccharides (starches, gums, and pectin), or proteins. Example starches

includes arrowroot, cornstarch, katakuri starch, potato starch, sago, tapioca and their derivatives. Microbial and vegetable gums used as thickeners include alginate, guar gum, locust bean gum, gum arabic, and xanthan gum. Proteins used as thickeners include collagen, egg whites, and gelatin. Sugar polymers include agar, carboxymethyl cellulose, pectin and carrageenan.

[0022] (iii) Mist-maker. When heated, the mist-maker forms a thick steam that is similar in appearance to tobacco smoke. Typical mist-maker that have found use in water-pipes include polyols such as glycerin, 1,2-propylene glycol, 1,3-propylene glycol, 1,2-butylene glycol, 1,3-butylene glycol, 1,4-butylene glycol, 2,3-butylene glycol, 1,2,4-butanetriol, triethylene glycol, triacetin, mannitol, sorbitol, xylitol, inositol, isosorbide, polydextrose, and mixtures of any two or more of the above.

[0023] (iv) Sweetener. Examples of sweeteners which may find use as ingredients for the coating layer include carbohydrate sweeteners, for example monosaccharides of 5 or 6 carbon atoms, such as arabinose, xylose, ribose, glucose, mannose, galactose, fructose, dextrose, or sorbose, or mixtures of two or more of the foregoing monosaccharides; disaccharides, for example, sucrose, such as cane or beet sugar, lactose, maltose or cellobiose; polysaccharides, such as partially hydrolyzed starch or dextrin, as well as polyols, such as sorbitol, mannitol, xylitol, mixtures thereof and mixtures with one or more of the above sugars. In some embodiments, the sweetener is high-fructose corn syrup, also known as glucose-fructose, isoglucose and glucose-fructose syrup, which is prepared by enzymatically breaking down corn starch into glucose and further processing with glucose isomerase to convert some of the glucose into fructose. Example artificial sweeteners include sodium, calcium or ammonium saccharin salts, dihydrochalcones, rebaudiosides, mogrosides, glycyrrhizin, dipotassium glycyrrhizin, glycyrrhizic acid ammonium salt, L-aspartyl-L-phenylalanine methyl ester, (aspartame), the sodium or potassium salt of 3,4-dihydro-6-methyl-

l,2,3-oxathiazine-4-one- 2,2-dioxide (Ace-sulfame-K), as well as extracts of *Stevia rebaudiana* (Stevioside), *Richardella dulcifica* (Miracle Berry), *Dioscoreophyllum cumminsii* (Serendipity Berry), and mixtures of any two or more of the above.

[0024] (v) Flavorings. Suitable flavors or flavorings include, but are not limited to, mint, such as peppermint and spearmint, chocolate, licorice, citrus and other fruit flavors, gamma octalactone, vanillin, ethyl vanillin, breath freshener flavors, spice flavors such as cinnamon, methyl salicylate, linalool, bergamot oil, geranium oil, lemon oil, and ginger oil. Other suitable flavors may include flavor compounds selected from the group consisting of an acid, an alcohol, an ester, an aldehyde, a ketone, a pyrazine, combinations or blends thereof and the like.

[0025] (vi) Stimulant. In addition to the ingredients above, the coating layer may include one or more substances having a stimulatory effect on the central nervous system and inducing alertness in a subject. Caffeine (1,3,7-trimethylxanthine), taurine (2-aminoethanesulfonic acid), and theobromine (3,7-dimethylxanthine) and their derivatives are the most common stimulants that may be used in addition to or instead of nicotine, but other substances amenable to delivery through inhalation in the form of water-pipe smoke, for example extracts of plants such as guarana or ginseng, are also contemplated.

[0026] (vii) Colorant. To provide a colorful, desirable appearance to the capsules, the coating layer may include one or a blend of colorant additives preferably chosen from among those listed as suitable and safe for use in foods, drugs, or cosmetics. Example useful dyes include water-soluble colorants of plant origin, including beet juice, brazilwood, caramel, carminic acid, litmus, logwood, orchil, and saffron, but artificial colorants that are safe for use in water-pipe smoking applications are also contemplated.

[0027] Although the relative amount of each component may substantially vary depending on the desired properties of the final product, in representative embodiments the core beads account for about 50 – 53 wt% of the overall weight of the capsules while the amount of absorbent-binder is from about 6 – 8 wt%. The capsules of the representative embodiments also include about 1.5-2 wt% thickener, about 6-9 wt% mist-maker, about 14-18 wt% carbohydrate sweetener, about 2-5 wt% flavoring, and about 0.01 wt% colorant. In instances where the coating is formed from an aqueous mixture of ingredients, the amount of water in the coating is about 6-8 wt% of the overall weight of the capsules.

[0028] MANUFACTURING THE CAPSULES

[0029] In representative embodiments, a method of manufacturing capsules for delivery of a flavoring in water-pipe smoke is provided, as illustrated in the non-limiting example flow-chart of FIG. 1. The method (100) includes the forming of a coating mixture containing the flavoring and its application to core beads, to form a coating layer precursor. An absorbent-binder is then added, turning the precursor into a coating layer encapsulating the core bead.

[0030] A coating mixture is first created by dissolving or suspending ingredients including the flavoring, a mist-maker, a sweetener, and a thickener in a solvent (Block 102). In some embodiments, one or more of the ingredients, for example the flavoring, may be introduced at a later stage of the process rather than as components of the coating mixture. Selection of the appropriate solvent is dependent, inter alia, on the need of forming homogeneous mixtures having the appropriate viscosity and other desired attributes when the solvent is combined with the other ingredients. In some embodiments, the solvent is water either alone or in combination with aqueous dissolvable solvents such as methanol, ethanol, isopropanol, glycol ether solvents, and combinations thereof. The coating mixture may also include additives such as colorants and

stimulants. Certain additives may be used, among other purposes, to aid in dispersing the other ingredients in the solvent.

[0031] Once ready, the coating mixture is applied to core beads (Block 104). In one exemplary embodiment, a batch of core beads (200) are placed in the pan of a spray coating machine which is made to rotate in an orbital manner. The rotating motion causes the beads to tumble within the pan. During the orbital tumbling motion of the beads, the coating mixture is added, to form a coating layer precursor on the surface of the beads. The coating mixture may be introduced by spraying which can produce a faster and more even distribution than simply introducing it as a liquid.

[0032] Once a sufficient amount of coating mixture has been added, an absorbent-binder is introduced (Block 106). In instances where the absorbent-binder is a powdery substance, it may be applied by feeding into the coating machine while the pan is rotating (Block 108), resulting in a dusting of the absorbent-binder onto the beads. Rotation may be protracted until the applied absorbent-binder is evenly distributed and the particles are covered by a homogeneous coating, then the beads are dried (Block 110) by evaporating at least a portion of the solvent present in the coating layer precursor, for example by flowing air through the pan, producing beads with a dry and smooth touch and feel that have no liquid or sticky residues on their surface. Where desirable, one or more ingredients, for instance the flavoring, may be added to the coating at this stage rather than as component(s) of the coating mixture.

[0033] In some instances, it may prove beneficial to divide the coating mixture into two or more portions. The first portion is combined with the absorbent-binder on the surface of the beads, as described above, to form a first stratum of the encapsulating layer. Then, the second portion is

applied and formed into a second stratum overlaying the first stratum. The process may be to apply one more additional portions until the encapsulating layer has attained a desired thickness.

[0034] EXAMPLE

[0035] An aqueous coating mixture was formed by dissolving glycerin, fructose, gum arabic, and a blue colorant in distilled water at a temperature of 80 °C. The parameters of each ingredient are listed below in Table 1:

GLYCERINE		
PARAMETER	*SPECIFICATION*	*TEST METHOD*
Appearance	*Transparent*	*Visual*
Specific Gravity @25	*Min 1.2612*	*Analytical*
Moisture	*Max 0.3 %*	*Analytical*
Glycerin content	*Min 99.7 %*	*Analytical*
FRUCTOSE		
PARAMETER	*SPECIFICATION*	*TEST METHOD*
pH	*3.3-4.5*	*Analytical*
Acidity	*Max 4 ml*	*Analytical*
Dry Substance	*% 76.8-77.4*	*Analytical*
Flavor	*Sweet*	*Taste*
Refractive index at 20°C	*1.4774 - 1.4798*	*Analytical*
Colour-Icumsa	*Max 20*	*Analytical*
Brix (20°C)	*74.80 - 75.80*	*Analytical*
GUM ARABIC		
PARAMETER	*SPECIFICATION*	*TEST METHOD*
Moisture	*Max %13*	*Analytical*
Odor	*Odorless*	*Smell*
pH	*4-5*	*Analytical*
Viscosity (25.0%,LV@60rpm)	*300 cps*	*Analytical*
Total Ash Content (FCC)	*Max %4*	*Analytical*
Powder Color (Visual)	*White-Off White*	*Visual*

TABLE 1

[0036] Solid, polished beads of soda lime glass having diameters between 4 mm and 5 mm were placed inside the pan of a coating machine that was set rotating by a motor. While the beads were

tumbling inside the pan, the coating mixture and a liquid flavoring were sprayed through a nozzle onto their surface. Thereafter, fumed silica powder having a BET surface area of 175-225 m^2 was dusted over the beads, the pan was left to rotate for another 2-3 minutes, and the product capsules were dried by flowing air.

[0037] The product capsules underwent shaking tests to determine the stability of the coating, as follows. A first sample of capsules S1, a second sample S2, a third sample S3, and a fourth sample S4 were each placed in closed packaging containers and subjected to manual shaking for a number of cycles as reported below in Table 2. Thereafter, each container was emptied on a sheet of paper, and the number of particle residue fragments left inside the container and on the paper were collected and counted. The number of coating residue fragments counted in each experiment are also reported in Table 2:

SAMPLE	CYCLES	FRAGMENTS IN PACKAGING	FRAGMENTS ON PAPER	REMARKS
S1	100	1	1	Fragments appear to have broken from the coating due to shaking
S2	150	1	0	Fragments appear to have broken from the coating due to shaking
S3	200	0	3	Fragments appear to have broken from the coating due to shaking
S4	200	0	0	

TABLE 2

[0038] Samples S1, S2, and S3 were also placed in a sieve shaker (AS 200 basic, Retsch, Germany) and shaken at an amplitude setting of 50 for a duration of 5 minutes. As reported below in Table 3, no fragments were found in either the packaging or on the paper:

SAMPLE	CYCLES	FRAGMENTS IN PACKAGING	FRAGMENTS ON PAPER
S1	5 min, 50 ampl	0	0
S2	5 min, 50 ampl	0	0
S3	5 min, 50 ampl	0	0

TABLE 3

[0039] Overall, the foregoing data indicates that the coating of the particles was solid and resistant to fragmentation.

CLAIMS

1. A capsule for delivery of a flavoring in water-pipe smoke, the capsule comprising:

(a) a core bead of an inert material, and

(b) a coating layer encapsulating the bead,

wherein:

(i) the coating layer comprises the flavoring, an absorbent-binder, a mist-maker, a sweetener, a thickener, and

(ii) the coating layer is configured to release the flavoring, sweetener, and mist-maker when heated.

2. The capsule according to claim 1, the coating layer further comprising a colorant.

3. The capsule according to claim 1, the coating layer further comprising a stimulant.

4. The capsule according to claim 3, wherein the stimulant is selected from the group consisting of caffeine, taurine, theobromine, nicotine, and combinations thereof.

5. The capsule according to claim 1, wherein the sweetener is selected from the group consisting of high-fructose corn syrup, fructose, glucose, sucrose, maltose, and combinations thereof.

6. The capsule according to claim 1, wherein the material of the core bead is selected from the group consisting of stone, sand, glass, and combinations thereof.

7. The capsule according to claim 1, wherein the material of the core bead is glass.

8. The capsule according to claim 1, wherein the absorbent-binder is selected from the group consisting of fumed silica, amorphous silica, talc, and combinations thereof.

9. The capsule according to claim 1, wherein the mist-maker is selected from the group consisting of glycerin, 1,2-propylene glycol, 1,3-propylene glycol, 1,2-butylene glycol, 1,3-butylene glycol, 1,4-butylene glycol, 2,3-butylene glycol, 1,2,4-butanetriol, triethylene glycol, triacetin, mannitol, sorbitol, xylitol, inositol, isosorbide, polydextrose, and combinations thereof.

10. The capsule according to claim 1, wherein the thickener is selected from the group consisting of arrowroot, cornstarch, katakuri starch, potato starch, sago, tapioca, alginate, guar gum, locust bean gum, gum arabic, xanthan gum, collagen, egg whites, gelatin, agar, carboxymethyl cellulose, pectin, carrageenan, and combinations thereof.

11. A water-pipe comprising the capsule according to claim 1.

12. A method of manufacturing a capsule for delivery of a flavoring in water-pipe smoke, the method comprising:

forming a coating mixture from ingredients comprising: a solvent, a mist maker, a sweetener, and a thickener;

applying the coating mixture to a core bead of an inert material, to form a coating layer

precursor on the surface of the core bead;

applying an absorbent-binder material to the coating layer precursor,

evaporating at least a portion of the solvent of the coating layer precursor, and

applying the flavoring to the coating layer precursor, to form a product capsule comprising a coating layer encapsulating the core bead.

13. The method of manufacturing a capsule according to claim 12, wherein the coating mixture is applied to the core bead in a spray coating machine.

14. The method of manufacturing a capsule according to claim 12, wherein the solvent is an aqueous fluid.

15. The method of manufacturing a capsule according to claim 12, wherein the ingredients of the coating mixture further comprise a colorant.

16. The method of manufacturing a capsule according to claim 12, wherein the ingredients of the coating mixture further comprise a stimulant.

17. The method of manufacturing a capsule according to claim 16, wherein the stimulant is selected from the group consisting of caffeine, theobromine, taurine, nicotine, and combinations thereof.

18. The method of manufacturing a capsule according to claim 12, wherein the sweetener is

selected from the group consisting of high-fructose corn syrup, fructose, glucose, sucrose, maltose, and combinations thereof.

19. The method of manufacturing a capsule according to claim 12, wherein the inert material of the core bead is selected from the group consisting of stone, sand, glass, and combinations thereof.

20. The method of manufacturing a capsule according to claim 12, wherein the absorbent-binder is selected from the group consisting of fumed silica, amorphous silica, talc, and combinations thereof.

100

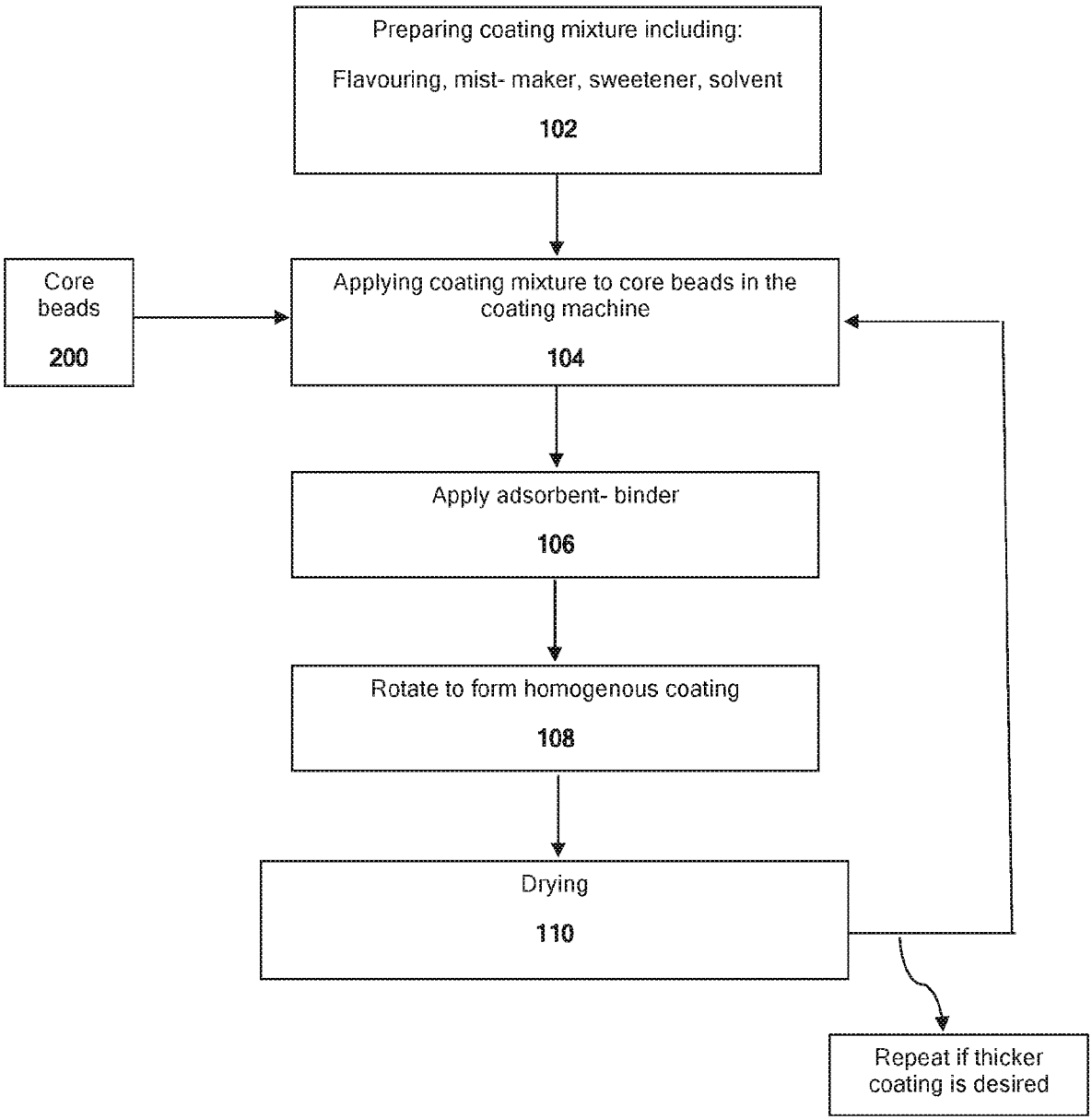
Preparing coating mixture including:
Flavouring, mist- maker, sweetener, solvent
102
Core beads
200
Applying coating mixture to core beads in the coating machine
104
Apply adsorbent- binder
106
Rotate to form homogenous coating
108
Drying
110
Repeat if thicker coating is desired

FIG. 1

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2020/050451

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24B15/16 A24B15/28 A24B15/42 A24F1/30 A24F1/32
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24B A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2014/150809 A1 (JANTSCH ANDRÉ [DE]) 5 June 2014 (2014-06-05) paragraph [0001] paragraph [0013] - paragraph [0027] claims 1-29 -----	1-20
A	EP 3 351 121 A1 (IODICE BIANCA [US]) 25 July 2018 (2018-07-25) paragraph [0006] - paragraph [0009] paragraph [0012] - paragraph [0013] paragraph [0015] - paragraph [0020] paragraph [0026] claims 1-20 -----	1-20
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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20 July 2020	30/07/2020

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Dimoula, Kerasina

2

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Information on patent family members

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